

W. & L. E. GURLEY, Troy, New York 12181, U.S.A.

Telephone (518) 272-6300 TWX (518) 241-6099 Cable "GURLEY"
 Engineering and Scientific Instrument Makers Since 1845

INCREMENTAL ROTARY ENCODER

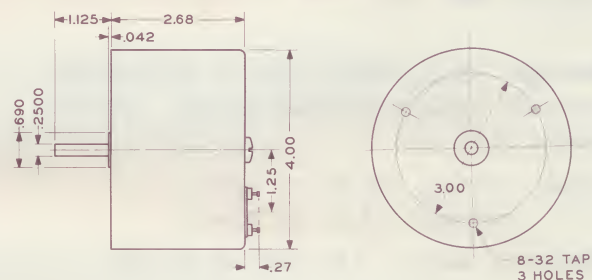
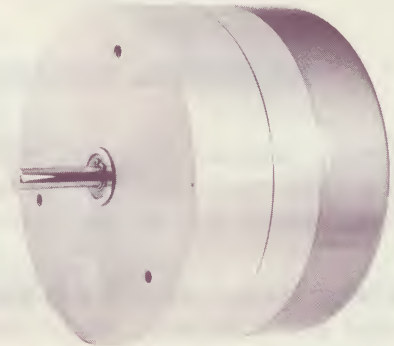
No. 8606 Industrial Control Type

The Gurley Model 8606 Incremental Encoder is designed to meet the need for a reliable low cost device for numerous industrial applications. The design is simple and rugged. A wide variety of standard pulse discs is available from stock patterns, and special discs are made to order on Gurley's precision dividing engines. Standard outputs are two square waves, Schmitt trigger, 90° out of phase, at a —6 volt level for logic one.

DESCRIPTION

Gurley Incremental Encoders are photoelectric devices which convert shaft rotation into electrical signals. The Encoder consists of a light-tight housing which contains a glass disc having precisely-spaced clear and opaque segments on its periphery; source of illumination; slit plate; and photo sensors. Rotation of the disc produces quadrature pulses on each of two lines which may be used for pulse multiplication, direction-sensing, or both, by the use of external logic. An index pulse is an available option at additional cost. Sense-of-direction is achieved by the use of two outputs spaced 90° out-of-phase so that the direction of rotation can be determined by external logic circuitry.

No. 8606 Incremental Encoder is a standardized model, for general industrial application, and is offered with pulse-per-revolution counts from 50 to 500 (see separate Table).



APPLICATIONS

Speed Measurement: The Gurley Incremental Encoder may be used as an electronic tachometer to measure or control speed of machine tools, rotational speeds of rolls in paper and similar machines, computer tape transports, computer drums, and other applications where it is important to have accurate measurement of rotational speeds.

Angular Measurement: Measure or control lead screws on jig borers, comparators, milling machines, drafting machines, inspection gaging machines; indicate shaft positions and count turns of valves, other position control equipment.



TYPICAL DISC PATTERN

STANDARD DISCS — PULSES PER REVOLUTION

50	125	256
64	128	360
90	180	400
100	200	500
	250	

Above patterns available from stock — others to specification. Double tracks, triple tracks, and index available.

GURLEY INCREMENTAL ENCODER

Model No. 8606

OPERATING SPECIFICATIONS

Speed: 3000 RPM, max.
Temperature: 5°C to 55°C

MECHANICAL SPECIFICATIONS

Case: Anodized aluminum, with closely-fitted rear cover readily removable for inspection. Fully sealed against dust, oil, and moisture.

Shaft: Stainless steel. Radial load 2 lbs. max., axial load 1 lb. max., Radial play .0005 max., end-play .0005 max.

Bearings: Two, ABEC Class 3, permanently-lubricated, stainless steel ball bearings. Double-shielded shaft seal.

Torque: starting: 0.4 in. oz. approx.
running: 0.2 in. oz. approx.

Moment of Inertia: 2.4×10^{-5} oz. in. sec.²

Disc: Optical quality glass, precisely centered and aligned. Pattern (see separate Table of available optional disc patterns) printed from masters generated on highest precision dividing engines.

Weight: 24 oz. (approx.)

Mounting: 3 size 8/32 tapped holes on 3 inch diameter. Servo plate mounting available at extra charge.

Life:

Lamp: 4000 hrs.

Bearings: 10,000 hrs. (at conditions specified)

ELECTRICAL SPECIFICATIONS

Lamp Voltage: 2.5 v. $\pm$.1 v., 350 ma.

Input Voltage: —12 v. d. c. @ <25 ma. peak, 10% regulation 1% ripple + 6. v. d. c. @ <10 ma. peak, 10% regulation, 1% ripple.

Output Voltage: —6 volt square wave.

Frequency Response: To 25kc (—3DB)

Output Impedance: 300 ohms.

Phase Relationship: (Bidirectional) $90^\circ \pm 15^\circ$.

Rise and Fall Time: Less than 1 microsecond.

No. 8606 Encoder is also available without the wave-shaping Schmitt trigger electronics (photodiode output only). The typical input voltage to the photodiodes is 18 volts dc. An output load of 10,000 ohms is recommended.

CATALOG NUMBERING SYSTEM

ANGULAR INCREMENTAL ENCODER					OUTPUT CODE	EXPLANATION
Catalog No.	Case Size	Count	Output	Electronics		
	8606	250 (or other as specified)	4	70000	1	Single Track
					2	Single Track w/index
					3	Bidirectional
					4	Bidirectional w/index
					70,000	Schmitt Trigger

To order: Specify pulse rate, and output code. Schmitt trigger will be furnished unless otherwise specified.

Example: No. 8606-250-4-70000 is a No. 8606 Encoder with 250 pulse per revolution disc, bidirectional with index, and having square wave output.

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No. 8607 INCREMENTAL ROTARY ENCODER

A new precision optical shaft angle Encoder is now available from W. & L. E. GURLEY. Designated as Cat. No. 8607, the new instrument is a precision miniature unit designed for use where light weight and compactness are a requirement. The construction is rugged, and the Encoder will withstand normal shock, vibration and temperature changes as well as being well-shielded against dust and moisture.

Miniature Size: No. 8607 is only 1.375 in. O. D. and weighs, with its integral electronic package, 3¼ oz.

Rugged Construction: The stainless steel shaft rotates in two Class 7 permanently-lubricated stainless steel ball bearings. Radial load 0.5 lb., axial load 0.5 lb., radial play 0.0005 in., and end-play of 0.0005 in. are regularly supplied.

Integral Electronics: The back case of No. 8607 contains two integrated circuit amplifiers. The circuits are mounted on a single printed circuit board and are solid-state throughout. The 6 volt outputs may be fed directly into counters or other devices.

Long Life: Lamps are operated substantially below rated voltage and are guaranteed for 10,000 hours but are likely to have indefinite MTF. All parts are well shielded against dust, moisture

and contaminants. The aluminum case is anodized and sealed.

Wide Choice of Pulse Rates: No. 8607 Encoder is supplied with precision glass discs, optically ground, polished and printed with clear and opaque interruption patterns. Standard pulse rates available "off-the-shelf" are:

Pulses per Revolution

1 - 10 - 30 - 36 - 50 - 100 - 120 -
 360 - 500 - 1000 - 1024

Virtually any other pulse pattern up to 1024 can be supplied to order. Two or three tracks are also available.

Gurley pulse discs are generated on highest precision dividing engines and are printed in a glue-silver emulsion which is completely opaque without film in the clear areas to obstruct the passage of light.

Photosensing: The photosensing elements are silicon cells.

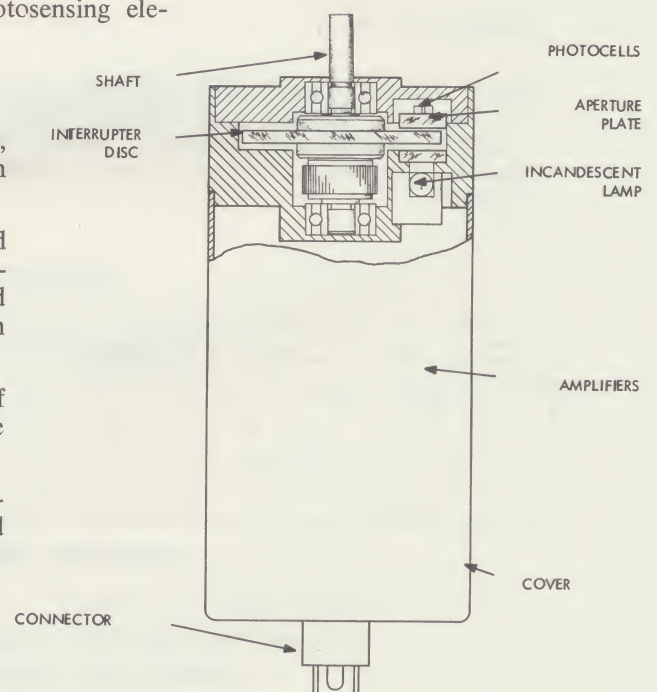
APPLICATIONS

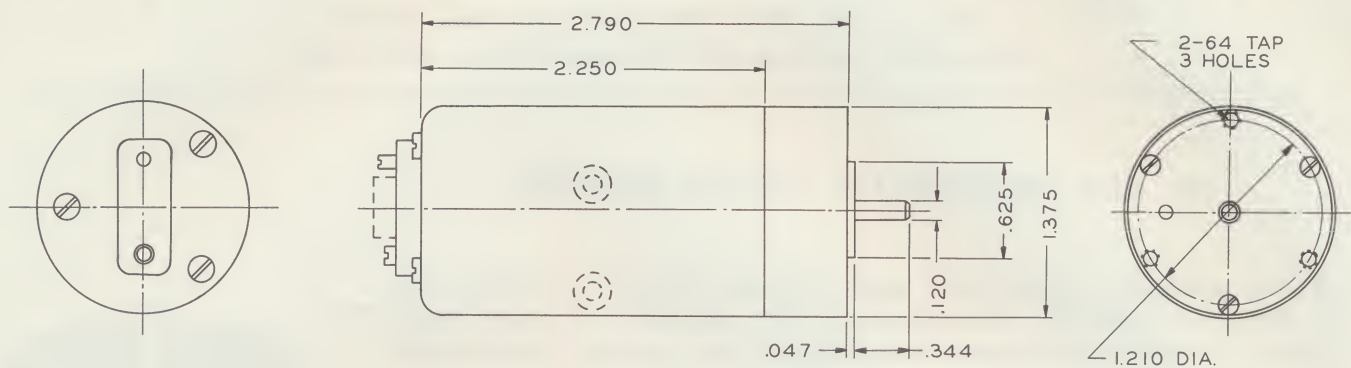
Speed Measurement: Measure or control speed of machine tools, tape transports, computer drums, or in any use where a precision electronic tachometer is required.

Shaft-angle: No. 8607 is designed to measure or control lead screws in jig borers, comparators, drafting machines, coordinatographs, and inspection gaging tools; or to indicate shaft-position and count turns or valves, remote indication devices and other position control equipment in inaccessible locations.

In *aircraft* No. 8607 Encoder offers unusual advantages because of its accuracy and long-life trouble-free construction in radars attitude indicators and air-borne computers.

In *missiles* No. 8607 offers the designer many advantages in reliability and accuracy, for the measurement and control of shaft speed or shaft-angle.





GURLEY INCREMENTAL ENCODER

Model No. 8607

MECHANICAL SPECIFICATIONS

Case: Anodized aluminum. Protected against dust, oil, and moisture.

Shaft: Stainless steel. Radial load 0.5 lbs. max., axial load 0.5 lb. max., Radial play .0005 max., end-play .0005 max.

Bearings: Two, ABEC Class 7, permanently-lubricated, stainless steel ball bearings.

Torque: starting: 0.2 in. oz. approx.
running: 0.1 in. oz. average

Moment of Inertia: 4×10^{-5} in. oz./sec.²

Disc: Optical quality glass, precisely centered and aligned. Pattern (see separate Table of available optional disc patterns) printed from masters generated on highest precision dividing engines.

Weight: 3¼ oz.

Mounting: 3 size 2-64 tapped holes on 1.210 inch diameter.

OPERATING SPECIFICATIONS

Speed: 3000 RPM, max.

Temperature Range: 10°C to 40°C.

Life:

Lamp: 60,000 hrs. average.

Bearings: 10,000 hrs. (at conditions specified)

ELECTRICAL SPECIFICATIONS

Lamp Voltage: 5-6 v. dc $\pm 2\%$ regulation

Output Load: 10 k ohms resistive

Output Voltage: 6 volt (min.) P-P quasi-sine wave centered about 0 volts dc.

Frequency: 3 db down at 10 kc.

Phase Relationship: (Bidirectional) $90^\circ \pm 15^\circ$

CATALOG NUMBERING SYSTEM

Case Size	Count	Output	CODE	EXPLANATION
No. 8607	From 1 to 1024 as specified	4	1 2 3 4	1-Single Track 2-Single Track w/index 3-Double Track (quadrature output) 4-Double Track — special counts as required

ORDERING AND SPECIFYING INFORMATION

Specify pulse rate, output

Example: No. 8607-360-2 indicates a No. 8607 Encoder with 360 pulses per revolution and quadrature output.